

ENGINEERING ENERGY IN AMERICA.

A few months since, the prophets of evil in this country expected an extraordinary and sudden collapse of the great American Republic. The hubbub was about to burst, and the mighty sham which boasted so much was about to go into a state of "everlasting smash." No doubt the wish was father to the thought in most instances, and the prophets, as Ben Disraeli says, are "baffled and mortified." It is not our province, however, to point out the errors of our countrymen, or to speculate on the political destinies of the American Republic, but rather to utter a passing comment on the amazing industrial energies of Americans, as indicated by Sir S. M. Peto, at Bristol, on the 13th inst. That prince of contractors went with others to America to endeavor to find fresh outlets for English capital. The newspapers have already informed us that wherever they went they were warmly and enthusiastically received. Sir Samuel, who is accustomed to see great engineering works achieved with rapidity, appears to be startled by the strong, buoyant, and multitudinous energies of our American cousins. He ascertained that when the Southerners destroyed the bridges throughout 150 miles of country, Gen. Sherman only allowed Gen. McCallum seven days to reconstruct them; one bridge 1,200 feet long and 15 feet wide was constructed in three days and a half; that in six days General Sherman was moving the whole of his army over the 150 miles. Sir Samuel also states that on the termination of the war there were actually connected with the supply of the armies 2,500 miles of railway, 387 engines, 600 cars, and 70,000 employees. Well might the imagination of the speaker be almost overwhelmed with the power which produced such a state of things. Sir Samuel further states that Chicago, which a few years ago was a mere village—a dot upon the map—has now a population exceeding a quarter of a million, "with public buildings surpassing anything he has ever seen in any provincial town in this country; while its bridges, its roads, its hospitals, its universities and public works were of the most magnificent description." From Chicago Sir Samuel went to Boston, and he found that even since the commencement of the war, the inhabitants of the city had expended five millions sterling in the erection of public buildings and the extension of public works. Were not the speaker a sober, common-sense Englishman, we should have thought he wanted to play upon our credulity. He, however, is particular in fortifying his statements by substantial evidence. As an instance how soldiers are absorbed into private life, he says that four months before he visited America the army amounted to 1,200,000 men. Gen. Grant told him that he had mustered out 870,000, and that shortly they intended to have only 30,000 men in active service. When at Chicago he went over a large printing establishment, in which forty-seven of the compositors had been soldiers. One was a captain, another was a lieutenant, and another was a sergeant, and they were all at work as if they had never left the compositor's desk. Not one of these men had a pension, and he would have felt insulted if he had been offered it. These statements of Sir Samuel Morton Peto are corroborated by indisputable authority. We may therefore, as a nation, well rejoice that the Americans have conquered their greatest difficulties, and that in all probability they will be purified and strengthened by the sufferings they have endured. At all events, even thoughtless and selfish Englishmen are not likely to speak of them so contemptuously as was the fashion a short time since.—*Building News.*

TO WHOM IT MAY CONCERN.

As the best way of bringing the annexed letters to the notice of the parties interested, we insert them in our paper. The SCIENTIFIC AMERICAN has an increasing circulation abroad, and we are constantly receiving inquiries about American patents, the propriety of investing in them, and general information concerning them:—

HAWKINS'S DIVING MASK.

MESSRS. EDITORS:—I would feel greatly obliged if you could put me in the way of communicating with the manufacturer of Hawkins's Diving Mask or appa-

ratus, as I see it was patented through your Agency.
CAPT. A. CROWN, Russian Navy.
G. Winchester Buildings, Old Broad street, London,
E. C.

WELL BORING.

MESSRS. EDITORS:—In your number of SCIENTIFIC AMERICAN, July 1, 1861, I read a short description of automatic well bores by Gen. H. Haupt. Can you give me his address, or tell me if there has been any further or fuller description of the machine?

JOHN ALLEYNE BOSWORTH.

Humberstone Leicester, ng., Nov. 14, 1865.

Silver, Copper and Railways in Chili.

On a chilly night, thirty years ago, a shepherd made a fire in the mountains of Copiapo, Chili, and next morning he saw at his feet a stream of silver, which the heat had melted. That was the discovery of the mines of Copiapo, which have produced in thirty years more than \$100,000,000. Now they are rather in the decay; but the produce of the last year was \$1,638,272—a sum inferior to that of Guanajuato and Real del Monte, which Maximilian wishes to develop, in Mexico, against the decided opinion of the old and glorious President, Monroë.

Next follows the province of Loquimbo, whose capital, the beautiful town of La Serena, rests a real syren at the foot of the hills by the sea-side, supporting a population of thirty thousand inhabitants.

The wealth of that province is almost indescribable. There is, indeed, a mountain, that of Famaya, formed, if it could so be said, of pure copper ore. The value of this single product, as it is manufactured in Chili, was, in 1864, of \$9,506,957, and that of the copper regulus, or in its more imperfect state, \$4,716,912, making in the whole (and not taking in consideration the raw ore sent to England, and which is worth several millions,) the immense amount of \$14,221,849.

The London Times, denouncing to all civilized nations, in warm and eloquent language, the unwarrantable conduct of Spain toward Chili, declares, in its leading article of the 19th inst., that out of 498,780 cwt. of manufactured copper imported last year into England, 304,380 cwt., that is to say, more than two-thirds, came from Chili, and that out of 25,000 tons of regulus 22,000 tons, or almost the whole quantity, came from that source.

In the progress of steam locomotion, Chili stands so high that only four countries—the United States, England, France, and Germany—possess greater extent of railroad, taking in consideration the size of the respective countries. Chili possesses at present six main lines of railways.

The northern one connects the port of Caledra with the silver regions of Copiapo, and was the first ever built in South America (1850) previous to the erection of the line of Panama, which has an extent of forty-seven miles. The second is that of Canisal, twenty-four miles in length. It has been built by Americans and native capitalists for bringing to the sea-shore the rich copper ores of the interior.

The third is much more important, as it runs south from La Serena, capital of Coquimbo, and is intended to join with that between Valparaiso and Santiago, a distance of about five hundred miles south. Of this line ninety miles are complete, and as many in course of progress.

The fourth is the famous railway between Valparaiso and Santiago, over immense mountains, built at an expense of twelve millions of dollars. It was laid out by the eminent American civil engineer, Allen Campbell, now residing in this city, in a very high position, and completed, as a contractor, by another American of great enterprise and generous heart, Henry Meiggs. This line extends over more than 135 miles over a rough country, and is considered a work inferior to none for its boldness and solidity.

The fifth line extends from Santiago, through the inland valleys and over level ground, to San Fernando, a distance equal to that between Valparaiso and Santiago, but, passing through a highly cultivated plain, it has cost only half the amount of the last. A distinguished American engineer, Colonel Walter W. Evans, now of this city, was the builder of this railway.

Lately, grants for four new branches of railroads were made by the Legislature, and the line going

southward from Santiago will be extended this summer to Curico, at an expense of nearly \$1,500,000.

The purpose of the government is to build a central line between Santiago and Concepcion, on the banks of the Biobio, a distance of about 600 miles, of which there are 150 completed, the whole of the country having been carefully surveyed. The actual value of the railways of the country, which measure nearly 500 miles, is \$30,000,000, and it is thought that at the expense of less than that amount more, a complete line of rails will run from La Serena to Concepcion, (a distance of more than 1,000 miles,) and all within the course of ten or fifteen years.

When this great work, to which the country and Congress lent their utmost support, will be completed, Chili cannot but be the best organized and best protected against internal or foreign foes among all other countries. Lines of telegraph run parallel to all the railways, and the very day war was declared against Spain orders were given to extend the magnetic wire from the northern to the southern extremity of the country, which work has been undertaken with unabated energy.

Steel Ropes.

In a paper by John Fowler and David Greig, of Leeds, Eng., read before the Institution of Mechanical engineers, the following statements were made in reference to iron and steel ropes:—

The fourth difficulty to be surmounted was, the production of a rope of sufficient strength and hardness, combined with elasticity, to stand the required work; and this was a very serious point, as the inability to accomplish it nearly upset, at one time, the profitable employment of steam cultivation.

The first rope used was made of iron wire; but it was worn out so quickly, not doing so much as 200 acres, that it soon became evident such material would not stand the strain and friction attending the work; while, by increasing the strength of the rope, its weight was so much increased as to consume nearly the whole engine power in overcoming its friction. These difficulties became so serious, that great exertions were made to get a rope of steel sufficiently hard to stand the wear of trailing on the ground, and also the friction caused by coming in contact with the numerous pulleys of the machinery then employed; and, in 1857, two steel ropes were applied, which answered the purpose admirably, and performed, with the then imperfect machinery, upwards of three times the amount of work that was done by the first iron rope. From this point, it was established undoubtedly that all risk of the difficulty with the rope causing a check to the application of steam to cultivation was now safely overcome; the introduction of the steel rope having effectually accomplished the object in view. The machinery for working the rope, however, required great improvement and alteration before getting to the point of thorough efficiency with a minimum of wear; the chief objects in these improvements being to have as few bends as possible, and those bends over large pulleys. A great saving in the wear of rope has also been effected by the improved means of keeping the rope tight, and preventing it from dragging on the ground. From time to time, as the various improvements in the machinery have been effected; the increased quantity of work done by the rope before being worn out has been very marked; so that the cultivation of from 2,000 to 4,000 acres can now be accomplished with one steel rope, the amount varying with the nature of the soil and the width of the implement used.

At the commencement of steam cultivation, the iron rope ran a mileage of not over 750 miles before being worn out, costing 1s. 7d. per mile of running. The first steel rope ran 1,800 miles, costing 1s. per mile; and the present steel ropes are running on an average 9,000 miles, costing only about 2½d. per mile, running with a tension upon them of about 25 cwt., and this, notwithstanding that the price of rope has been increased from £60 to £84 for the ordinary length of rope of 800 yards. The steel rope at present used in steam cultivation is 1½ inch in diameter, and weighs about 2 lbs. per yard, making a total of about 14 cwt. for the length of 800 yards.

THE Mississippi River, opposite St. Louis, was frozen over on the 16th inst.